

# TOYO's Cutting Wheels

## 1. ELECTRIC DISCHARGE-GROUND EDGE:

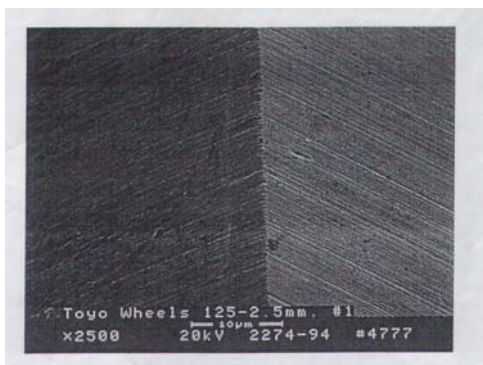
Toyo Cutting Wheel Chip is produced by Electric Discharge Grinding System.

### What is Electric Discharge Grinding ?

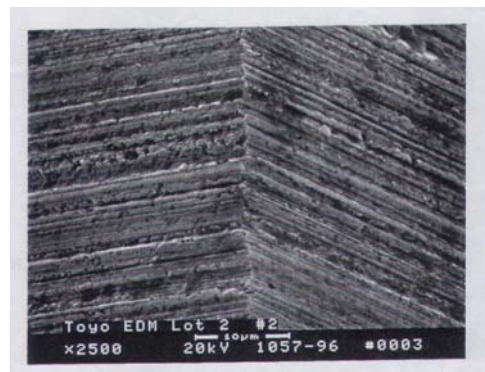
Anode or cathode is heated by Impact Energy of Positive Ion, and wheel shape is finished precisely by Evaporation or Melting Phenomenon which created by High temperature from Anode or Cathode, and not by Grinding Powder. Thanks to Electric Discharge Grinding, edge surface is very sharpen. Roughness of cutting edge can be set according to the power of Electrode.

### CUTTING EDGE CHARACTERISTICS WITH ELECTRONIC DISCHARGE GRINDING SYSTEM:

- ① Thanks to computer controlled ground wheel, no lifetime irregularity is happened.
- ② Thanks to the minimum R-shaped cutting edge, the wheel gives a superior score into the glass, and you can scribe the glass with low pressure, thus the clean scribe line can be realized.
- ③ In order to achieve the best scoring, we can produce the wheel which suitable to any type of glass (soda-lime glass, Non-alkaline glass, chemical/heat toughening glass, etc) or any type of hardness of glass, or any type of glass thickness.



Picture No. 101



Picture No. 102

enlarge picture (x 2500)

## 2.1 MATERIAL OF WHEEL

There are 2 types of wheels, one is super hard wheel and another another one is Diamond Compact Wheel, and scribing ability, life & price are different according to the type of wheel.

MATERIAL:

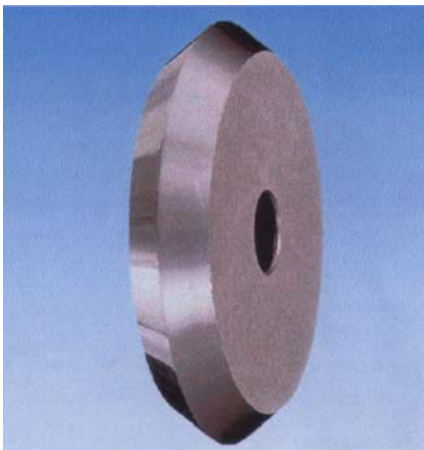
	MATERIAL
SUPER HARD	Tungsten Carbide Material
DIAMOND COMPACT	Diamond Sintering

CHARACTERISTICS:

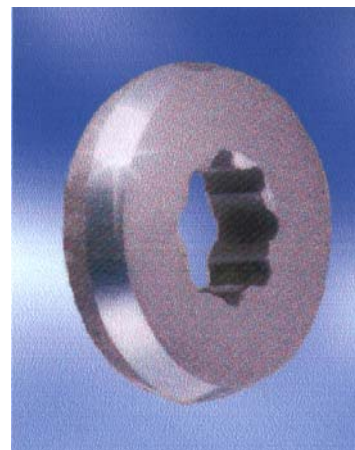
SUPER HARD	Many variations are available. Easy to Grinding. Applicable to many types of setting. Reasonable price, thus quite economical
DIAMOND	Minimum scribing defect. Extreme long life

## 2.2 SHAPE OF WHEEL:

There are 2 types of shapes of wheel, one is conventional type and another one is self vibration (TAP) wheel.



Picture  
Conventional wheel  
(super hard, Diamond)



Picture  
TAP wheel  
(super hard, Diamond)

### 2.3 EDGE GROUND:

Type of edge ground to be changed according to type of glass (non-alkaline glass, soda-lime glass or chemical/heat toughening glass etc) and scribing process.

#### Conventional wheel (super hard)

Grinding No.	Roughness	Type of Glass
100	Fine	Soda-lime glass
101	Fine	Soda-lime glass
102	Medium	Soda-lime glass, Hard glass (i.g. non alkaline)
103	Medium	Soda-lime glass, Hard glass (i.g. non alkaline)
104	Rough	Hard Glass, Hot Glass
105	Rough	Hard Glass, Hot Glass

#### TAP Wheel (super hard)

Grinding No.	Roughness	Type of Glass
306	Fine	Soda-lime glass
407	Medium	Soda-lime glass, Hard glass
406	Medium	Soda-lime glass, Hard glass
403	Rough	Hard glass, Hot glass

#### \* Characteristics of each grinding

Roughness	Grinding No. (note)	Characteristics
Fine	101, 306 308	Narrow Rib Mark, Clean Cutting Surface Strength of Cutting Edge is strong
Medium	102, 407 103, 406	Wide Scribing Setting Range, Stable Cutting
Rough	104, 403 105	Excellent Scoring against glass, Suitable for Hard Glass

## 2.4 SIZE AVAILABLE

	O.D.	I.D.	THICKNES S	CONVENTIONAL	TAP	DIAMOND		
1	10.0	1.8	2.0	O				
2	8.0	1.8	2.0	O				
3	6.0	1.5	1.1	O	O			
4	6.0	1.5	1.0	O	O			
5	6.0	1.4	1.1	O				
6	5.0	1.5	1.1	O		O		
7	5.0	1.4	1.1	O	O			
8	5.0	1.4	1.0	O	O			
9	5.0	1.3	1.0	O		O		
10	5.0	1.3	0.7	O				
11	4.5	1.4	1.0	O				
12	4.5	1.3	0.7	O				
13	4.0	1.6	1.1	O				
14	4.0	1.5	1.1	O		O		
15	4.0	1.5	0.7	O				
16	4.0	1.3	1.0	O	O			
17	4.0	1.3	0.7	O	O			
18	4.0	1.3	0.65	O				
19	4.0	1.0	1.1	O				
20	4.0	1.0	1.0	O				
21	4.0	0.9	1.0	O				
22	3.5	1.6	1.0	O	O	O		
23	3.5	1.0	1.1	O	O	O		
24	3.0	1.3	1.0	O		O		
25	3.0	1.1	1.0	O				
26	3.0	1.1	0.8	O				
27	3.0	1.1	0.65	O				
28	3.0	1.0	1.0	O				
29	3.0	0.9	1.0	O				
30	3.0	0.8	0.7	O	O			
31	3.0	0.8	0.65	O	O	O		
32	2.5	0.8	0.65	O	O	O		
33	2.0	0.8	0.65	O	O	O		

### 3.1 CHARACTERISTICS OF TAP WHEEL (CONCEPT OF DEVELOPMENT)

Thanks to the special shape inside, the wheel itself produces slight vibration while rolling. Rolling defect might suddenly be happened in the conventional wheel while scribing due to the glass chip in the gap between wheel's inside and axle or due to friction. Even if you observe the scribe line, breaking defect is happened because no vertical crack is formed, and no one can expect the timing of rolling defect. Rolling defect effects the production yield. The rolling defect might be happened from the beginning, and you might suspect that "this is a defective wheel" although this is the normal and no wheel edge is consumed.

To prevent such a critical problem, TOYO developed Tap wheel (vibration wheel). The special shape inside is to reduce the rolling friction due to glass chip between the wheel's inside and axle due to glass chip. Reduction of rolling defect corresponds to the longer life. Also thanks to self-vibration, it provides deeper median crack into the glass, you can realize square break for any glass in any thickness. LEAVING SMOOTH and FINE EDGE !

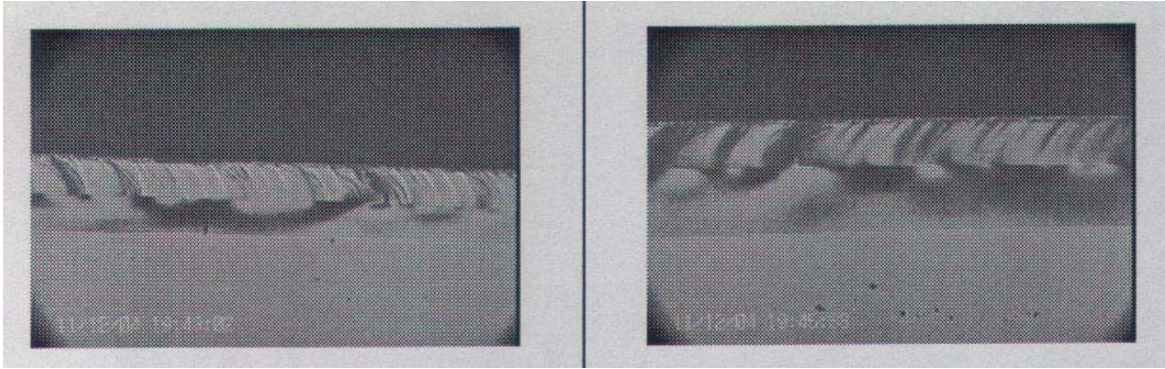
### 3.2 SHAPE INSIDE TAP WHEEL



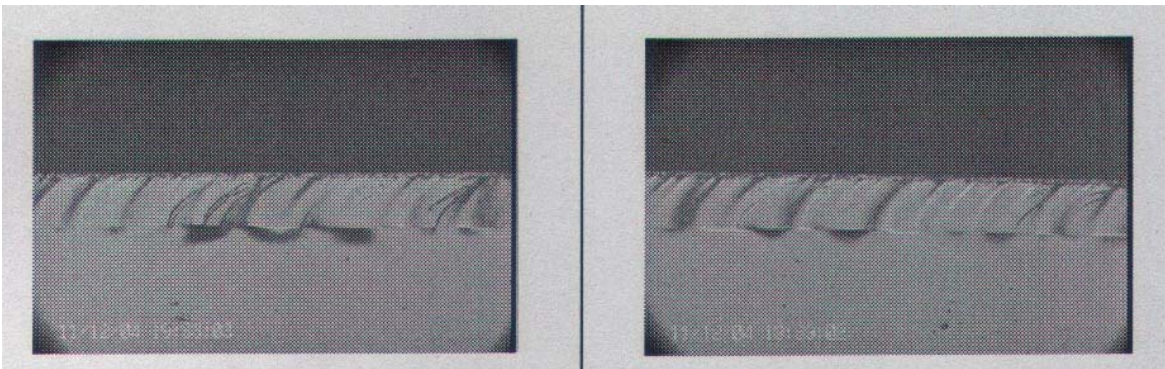
PICTURE

CUTTING WHEEL CLASSIFICATION					
CONVENTIONAL WHEEL					
GRINDING NO.	ROUGHNESS	ADVANTAGE		DISADVANTAGE	
101	FINE (MIRROR FINISH)	Narrow Rib Mark Fine Cutting Surface		Concern about abnormal cutting at cross point	

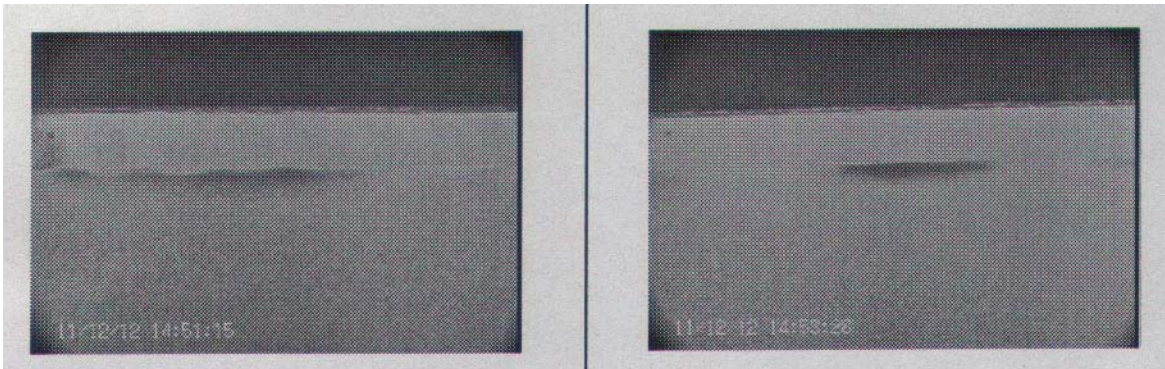
		Strong Glass Edge	Slip concern due to mirror finish
		Suitable for Soda-lime glass	Not suitable for Hard Glass
103	MEDIUM	Wide Range of glass (from Soda-lime to Hard glass)	None
		Suitable for Strip Cutting	
105	ROUGH	Suitable for Hard Glass	Rough Cutting Surface
		Glass	Glass Chips concern
		Wide Range of parameter setting	
		Very few abnormal cutting at cross point	
<b>TAP WHEEL</b>			
GRINDING NO.	ROUGHNESS	ADVANTAGE	DISADVANTAGE
306	FINE	Narrow Rib Mark	Concern about abnormal cutting at cross point
308	(MIRROR FINISH)	Fine Cutting Surface	
309		Strong Glass Edge	
		Suitable for PDA Panel	
306Y	FINE	No abnormal cutting at cross point	Cutting surface is a little rough comparing #306
	(MIRROR FINISH)		
407	MEDIUM	Fine Cutting Surface	None
		Suitable for TFT Panel	
407Y	MEDIUM	No abnormal cutting at cross point	Cutting surface is a little rough comparing #407
403	ROUGH	Good scoring against glass	Strength of glass edge is a little worse
		Improve Production Yield	
403G	ROUGH	Suitable for Hot Glass	Glass Chips concern



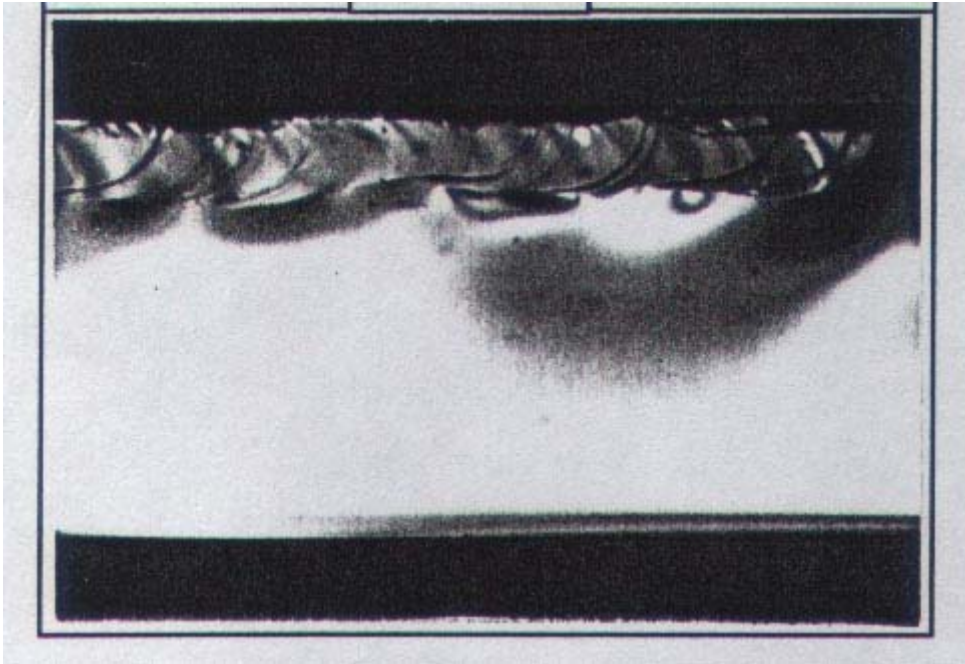
Toyo 103



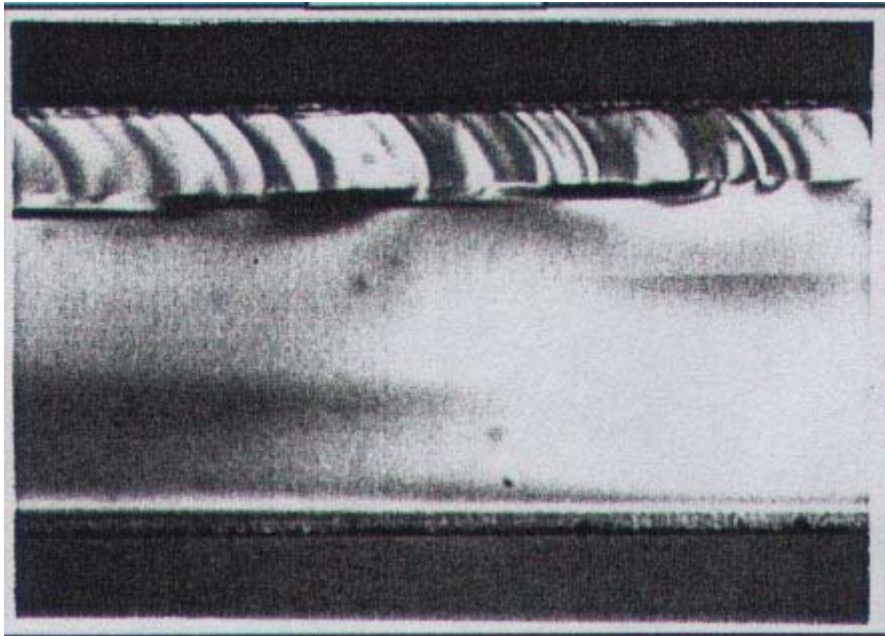
Toyo 105



Toyo 308



Bad cutting



Normal cutting